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EVALUATION REPORT

A Biological Evaluation of the Oak Leaf Tier, Croesia semipurana Keafott, on the Monongahela National Forest

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A BIOLOGICAL EVALUATION

INTRODUCTION

In 1965 on the Monongahela National Forest, West Virginia, some heavy defoliation by the oak leaf tier, Croesia semipurpurana Keafott, was observed, chiefly on the White Sulphur Ranger District. Defoliation over the whole Forest was observed in 1966, but that caused by the leaf tier was again largely confined to the one District.

Extensive tree mortality, concentrated on the White Sulphur District, was mapped for the Forest in August, 1966.

The Forest requested a biological evaluation in stands considered particularly valuable.

HOST TREES ATTACKED: scarlet oak, northern red oak, black oak

METHODS

The extensive defoliation of 1966 was mapped during an aerial survey. Ground checks revealed that nearly all the defoliation on the Forest was caused by the freeze of May 10. However, on the White Sulphur District some stands starting to refoliate after the freeze were defoliated a second time by the oak leaf tier. The insect defoliation was heavier and more extensive in 1966 than in 1965.

District personnel revealed that the area had experienced drought since 1962.

Because the combination of defoliation and drought was expected to result in tree mortality, an oak decline survey was flown in late August. Stands in which over one per cent of the trees were killed in 1966 were sketch-mapped on topographic maps. The stands with significant oak mortality (over five per cent) were concentrated on the White Sulphur District, but their location only occasionally coincided with the 1966 insect defoliation areas. The few areas of 1965 insect defoliation showed significant oak mortality in August, 1966 but most of the mortality mapped during the survey was in stands having no recent history of insect defoliation.

An examination of recently killed trees in stands mapped during the oak decline aerial survey revealed they had been heavily attacked by the two-lined chestnut borer, Agrilus bilineatus (Weber).

There is no proven method for sampling any stage of the oak leaf tier for predicting defoliation reliably. In order to gain some indication of insect population level, we sampled the egg stage. By felling a tree in the 1966 defoliation area and counting eggs in various parts of the outer crown, we learned that part of the egg population is available for sampling at the ends of branches in the lower crown. The egg survey method we then used consisted of cutting two one-foot branch ends in the lower crown from each of the two trees at each sampling point. The points were located at approximately one-mile intervals in the survey area. Branch ends were bagged, and the eggs were counted under a microscope indoors.

The egg survey was made in December in approximately 4000 acres of oak forest that the District considers valuable enough to warrant suppression. Most of that acreage had been defoliated by frost and the oak leaf tier in 1966, and some had been defoliated by the insect in 1965. The number of eggs found in this survey is tabulated below. (Refer to the attached map for the location of the sampling points.)

TABLE I. Average number of oak leaf tier eggs on the terminal foot of branches at sampling points in the evaluation area.

<u>Point No.</u>	<u>Avge. No. Eggs</u>
1	0.25
2	2.25
3	27.25
4	2.25
5	0.25
6	25.75
7	53.0
8	21.5
9	20.0
10	24.5
11	26.0
12	57.0
13	37.0
14	25.75
15	5.0

Because we do not know the proportion of these eggs that can be expected to hatch in 1967, our evaluation method for determining finally whether or not heavy defoliation threatens will consist of a larval sampling survey scheduled for shortly after the eggs hatch.

CONCLUSIONS

1. Trees of the red oak group on the Monongahela National Forest have been weakened by frost defoliation and drought. The weakest have been killed by the two-lined chestnut borer, producing extensive mortality, or "oak decline".
2. The greatest concentration of oak decline is on the White Sulphur Ranger District. Part of the greater mortality there is the result of defoliation caused by the oak leaf tier. Outbreaks of the insect were concentrated on that District in 1965 and 1966.
3. Trees defoliated are generally killed one or two years after defoliation.
4. It is concluded that suppression of the two-lined chestnut borer would have to be so extensive and expensive that it cannot be attempted. A substitute objective could be to prevent the further weakening of trees.
5. Of course, tree weakening caused by frost and drought cannot be prevented; but that caused by oak leaf tier defoliation can be prevented through suppression, if it is warranted.
6. Although District management plans call for conversion of oak stands to pine, mortality is progressing so extensively and rapidly that management plans are upset.
7. The District considers that its most valuable remaining stands of host trees are located on the western slopes of the mountains east of Meadow Creek.
8. We conclude from 1966 defoliation records and the egg survey that the Meadow Creek stands are infested.

9. The number of oak leaf tier eggs found in the survey between sampling points #5 and #15 leads us to conclude that heavy defoliation there is possible in 1967. The area midway between points 5 and 6 southward to midway between points 14 and 15 comprises - even with the elimination of the sale area - approximately 2700 acres, 1200 more than indicated in the Project Proposal submitted by the Forest.

10. We know of no parasites or predators that might materially reduce the oak leaf tier populations.

11. If the oak leaf tier causes heavy defoliation in 1967, extensive oak mortality in 1968 will result in significant stand damage (over five percent mortality).

12. If heavy oak leaf tier defoliation in 1967 is prevented, there will be some oak mortality from past events that were harmful to the trees; however, oak decline in 1968 should prove negligible.

SUPPRESSION CONSIDERATIONS

1. For suppression, the only material we can recommend is an insecticide, carbaryl. The formulation should be one pound carbaryl plus four ounces of Pinolene #1882 in enough water to make one gallon of spray per acre.

2. Carbaryl has a low toxicity to fish, wildlife, birds and humans. Its residues deteriorate in a few days in the field. Nevertheless, it should be treated as a poison and, therefore, should not be applied to streams or lakes nor be handled by other than qualified personnel.

3. Honey bees are especially sensitive to carbaryl. Any hives within a half-mile of spray areas should be moved out for two weeks.

4. Carbaryl is supplied for mixing in the field as a fine powder. Whoever prepares the spray suspension should wear a respirator.

5. The application equipment should be one or more helicopters. It will be important to get spraying done as quickly as possible, once the signal to start has been

given. In the Meadow Creek area, the quickest job could be done by helicopter, with one or more heliports located just as close to the spray blocks as possible.

6. Carbaryl must be used in water. Spray droplets of water evaporate quickly. Apparently the smallest droplets of those applied are the most effective. To minimize evaporation, drift, sliding and turbulence, spraying should be done only during very early morning hours; the spray contractor should understand this restriction when he submits his bid.

7. We do not know the degree of larval mortality that will be achieved with carbaryl. Larval mortality will be high enough to prevent heavy defoliation in 1967, but the population might not be reduced enough to prevent multiplication to a level threatening defoliation in 1968. Therefore, the objective of suppression will have to be to prevent heavy defoliation in 1967.

8. It would be advantageous to adjust spray area boundaries to take advantage of natural features that will minimize the need for erecting markers to guide the pilot of the spray aircraft.

RECOMMENDATIONS

1. We recommend that the Forest reduce tree mortality by suppressing the oak leaf tier in 1967.

2. It will be necessary for the Forest to reconsider the values of the individual stands involved in the Meadow Creek area and either (a.) eliminate 1200 acres from consideration for suppression, or (b.) modify its Project Proposal for financing suppression in 1200 additional acres.

3. All planning after approval of the Project Proposal should be done on the assumption that a suppression project will be carried out in May, 1967, but that the decision for finally calling the aircraft to report for work be postponed until the Zone has made a larval survey soon after the eggs have hatched.

DISTRIBUTION

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DETAILED MAP OF EVALUATION AREA

SCALE: $\frac{1}{2}$ " = 1 MILE

